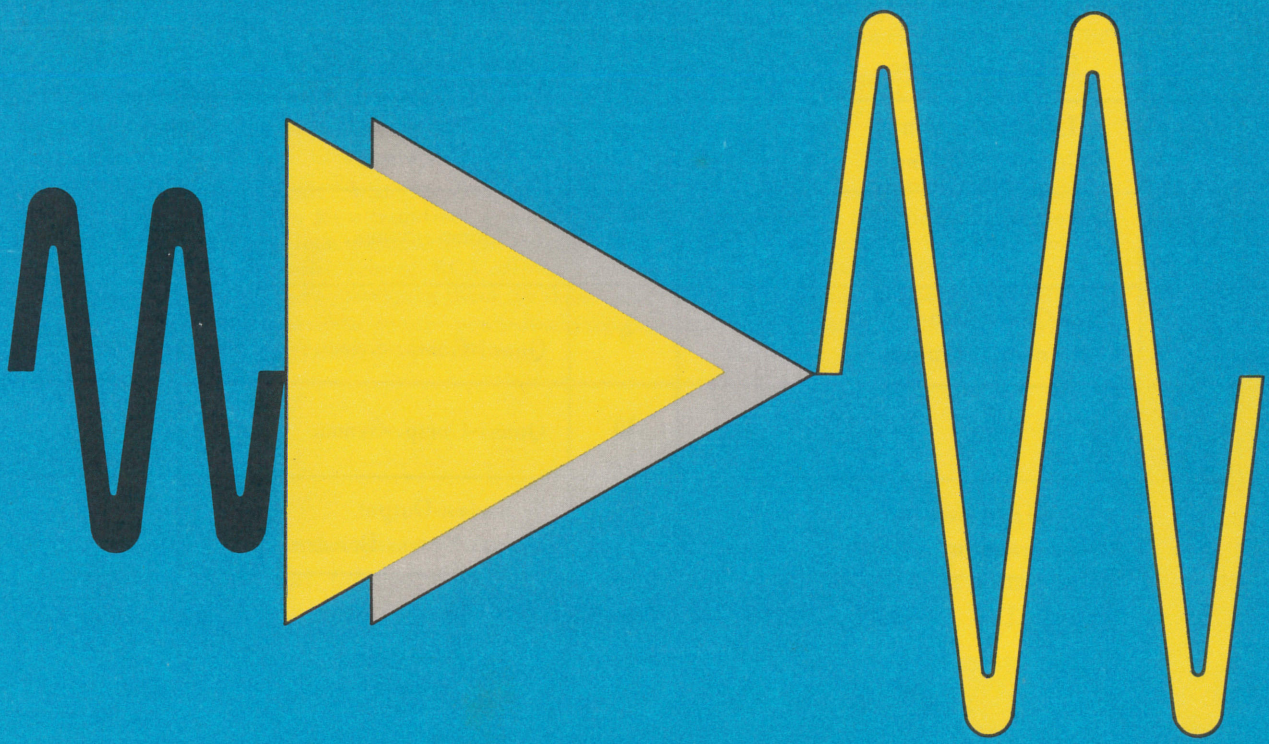
RCA

POWER TRANSISTORS

TYPICAL AUDIO AMPLIFIER CIRCUITS



RADIO CORPORATION OF AMERICA
ELECTRONIC COMPONENTS AND DEVICES, HARRISON, N.J.

ATC-500

RCA POWER TRANSISTORS

AMPLIFIER SELECTION GUIDE

Power Output (W)		Application	Class of Operation	Circuit				Page
RMS	Music			Circuit No.	Output Stage	Z_{out} (Ω)	Supply Voltage	
1	-	Radio (Line-Operated)	A	1	Single-Ended	3.2	82	4
1	2	Phono (Motor Overwind Supply)	B	2	Comp.-Symm.	12	-15	4
3	-	Stereo	AB	3	Comp.-Symm.	16	-15, -22	6
3.5	5	Intercom	AB	4	Comp.-Symm.	45	-41	6
4.5	-	TV Set (Line-Operated)	A	5	Push-Pull	3.2	130	8
12	17	Low-Cost General-Purpose	AB	6	Quasi-Comp.-Symm.	8	34	8
17	24	Low-Distortion General-Purpose	AB	7	Comp.-Symm.	8	37	10
25	34	Stereo	AB	8	Comp.-Symm.	8	46, 20	10
25	34	Low-Cost, High-Power General-Purpose	AB	9	Quasi-Comp.-Symm.	8	46	12
40	50	Stereo	AB	10	Quasi-Comp.-Symm.	8	58	12
70	-	High-Power General-Purpose	AB	11	Series-Output (Comp.-Symm. Drivers)	8	39, -39	14

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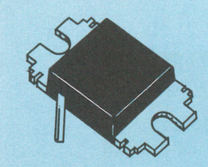
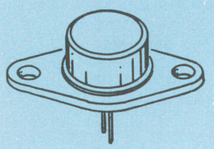
Printed in U.S.A. 6/67

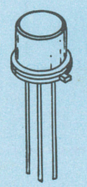
RCA's AUDIO CAPABILITY . . . Superior Transistors . . . High-Performance Circuits . . . Low Cost



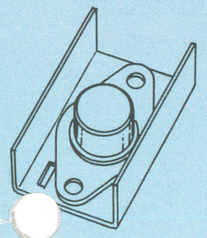
"PLASTIC TO-3"

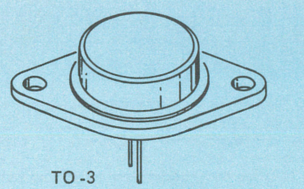


TO-66



TO-5





TO-3

Today's silicon power transistors are the heart of state-of-the-art audio systems. And RCA, leader in silicon-power technology, sets the pace for the entire industry by offering a wide choice of transistors designed specifically for audio circuits.

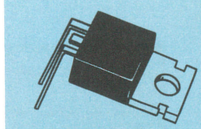
RCA's broad family of devices includes many types featuring the well-known "hometaxial-base"* design. These transistors are available in a wide range of power ratings and characteristics; all of these RCA transistors are rated to permit operation free from second breakdown.

Further, you can choose from a full complement of package types including the most popular JEDEC types as well as the new economy plastic cases (actually a molded-silicone plastic) such as the "plastic TO-3" featured in RCA's recently-announced 2N5036. . . an 83-watt transistor, the industry's most powerful unit available in a plastic package.

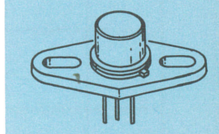
Included in this brochure are 11 audio amplifier circuits covering the power range from 1 watt to 70 watts (RMS). Quasi-complementary-symmetry, true-complementary symmetry, and all-silicon designs are featured. These circuit designs are all "production ready" and are backed by RCA's extensive experience in audio-circuit design. Design assistance and engineering support are available from RCA's audio power-transistor application activity.

*"HOMETAXIAL" was coined by RCA from two words, "homogeneous" and "axial," to provide a name for a transistor structure in which the base region comprises homogeneous resistivity silicon material in the axial direction (emitter-to-collector). This structure is used in an entire line of RCA silicon power transistors to provide definite advantages over graded-base structures (such as those resulting from multiple diffusions). The Hometaxial types provide greater power-handling capability, lower saturation resistance, and freedom from second breakdown.

Available for designers. . . application notes and technical data on specific types; for additional information, see your RCA Representative or write Commercial Engineering, RCA Electronic Components and Devices, Harrison, N.J. 07029

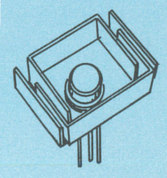


"PLASTIC TO-66"



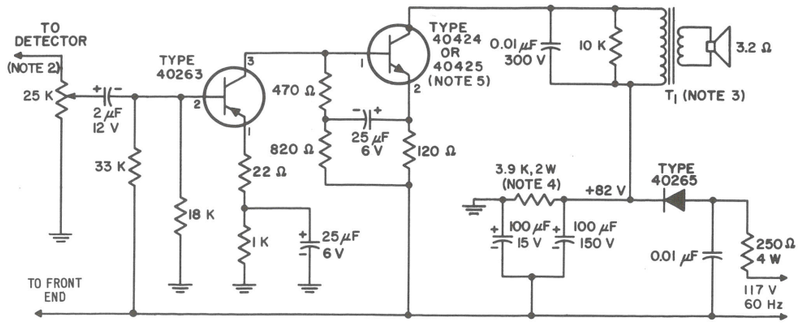
FLANGED TO-5

TO-1



1-W(RMS), LINE-OPERATED RADIO AMPLIFIER

With Integral-Heat-Radiator Output Type for PC Board Mounting



NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED.

NOTE 2: INPUT IMPEDANCE = 3 K (TYP.) 16 mV INPUT FOR 1-W OUTPUT.

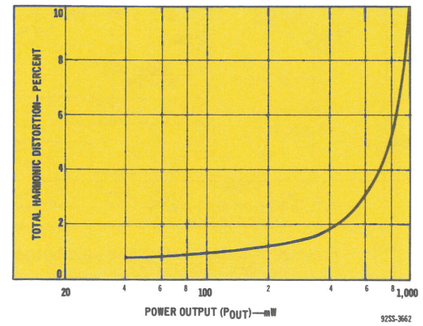
NOTE 3: 2.5-K PRI., 3.2-Ω SEC., FREED TYPE RGA-8, TRIAD TYPE S-12 X, OR EQUIVALENT.

NOTE 4: BASED ON 15-mA FRONT-END DRAIN. (40263 CURRENT NOT INCLUDED)

NOTE 5: TYPE 40425 MAY BE MOUNTED DIRECTLY ON A PRINTED-CIRCUIT BOARD WITHOUT ADDITIONAL HEAT SINK FOR OPERATION AT AMBIENT TEMPERATURES UP TO 55° C.

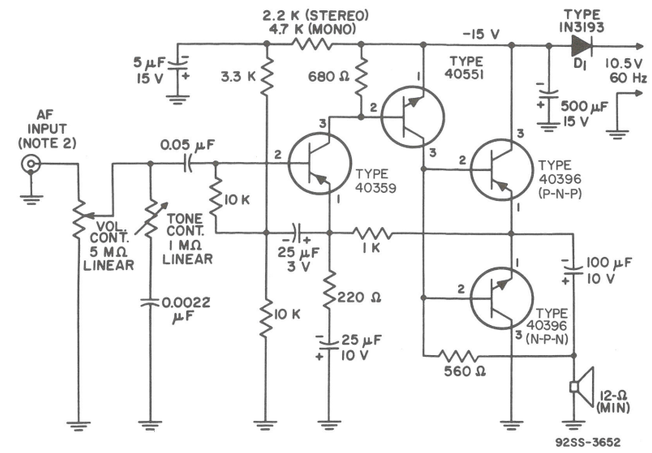
92SS-3651

- 1-W output at less than 10% distortion
- Frequency response (– 3 dB): 120 Hz to 7.6 kHz
- Transient-protection devices not required
- 72-dB power gain
- Hum & noise down 58 dB from 1 W (at full vol.)



1-W(RMS), LOW-COST PHONO AMPLIFIER

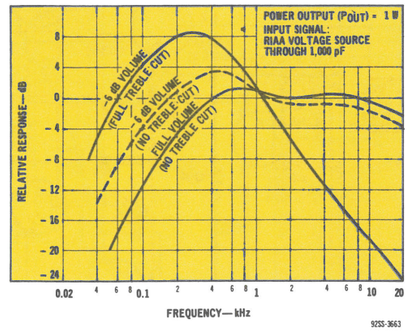
Complementary-Symmetry Circuit Delivers 2 Watts of Music Power



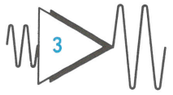
NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED

NOTE 2: 1-V INPUT FOR 1-W OUTPUT

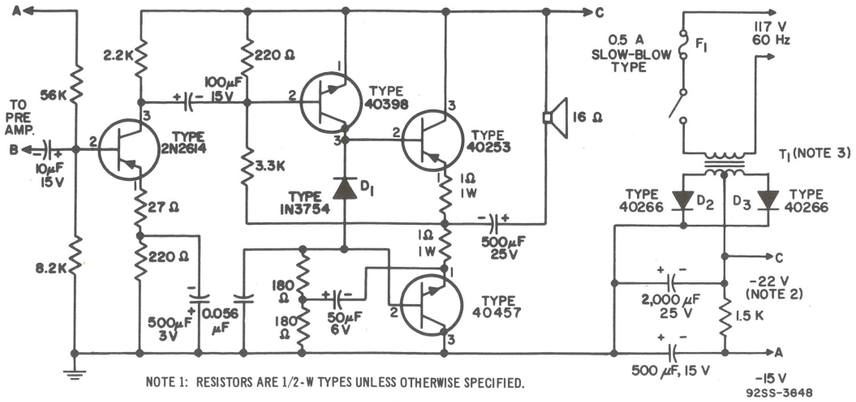
- 1-V input required for 1-W output
- Designed for use with phono motor overwind power supply



3-W(RMS) PER CHANNEL AMPLIFIER FOR STEREO APPLICATIONS



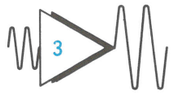
Complementary-Symmetry, Direct-Coupled Output Stage Employs "Bootstrap" Drive for Excellent Frequency Response



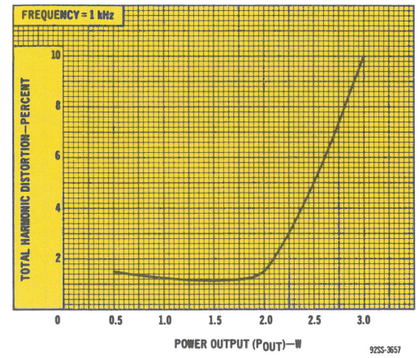
NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED.

NOTE 2: AT 95 mA DC, 20 V AT 285 mA.

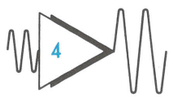
NOTE 3: BETTER COIL AND TRANSFORMER CO. NO. EX4744P, CP ELECTRONICS NO. 8970, OR EQUIVALENT.



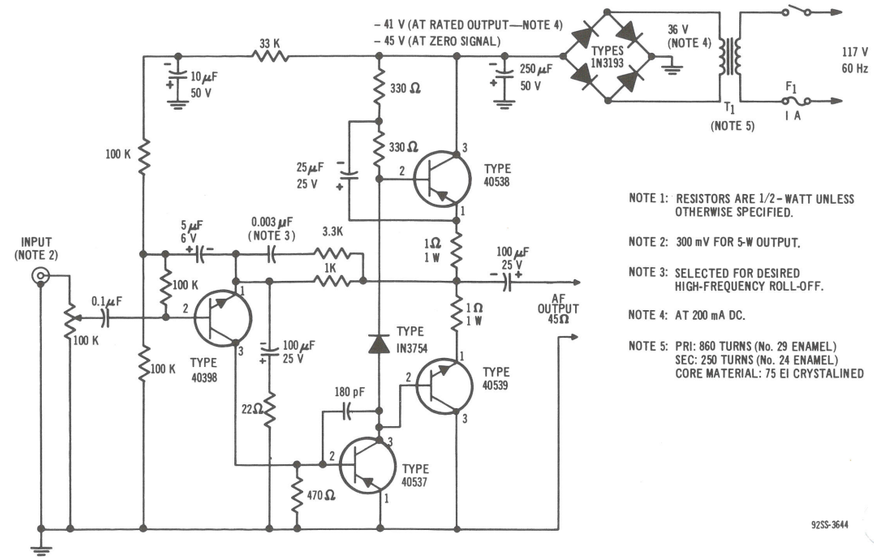
- 3-W output at less than 10% distortion
- 54-mV input (into 3 K) for 1-W output



3.5-W(RMS)/5.0-W(MUSIC) INTERCOM AMPLIFIER



Complementary-Symmetry Output Stage Direct-Coupled to 45-Ω Load



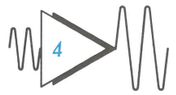
NOTE 1: RESISTORS ARE 1/2-WATT UNLESS OTHERWISE SPECIFIED.

NOTE 2: 300 mV FOR 5-W OUTPUT.

NOTE 3: SELECTED FOR DESIRED HIGH-FREQUENCY ROLL-OFF.

NOTE 4: AT 200 mA DC.

NOTE 5: PRI: 860 TURNS (No. 29 ENAMEL)
SEC: 250 TURNS (No. 24 ENAMEL)
CORE MATERIAL: 75 EI CRYSTALINED



- 3.5-W (RMS) at 1.0% total harmonic distortion
- Silicon output & driver transistors

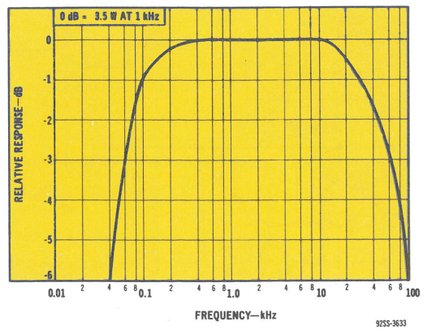


Fig. A

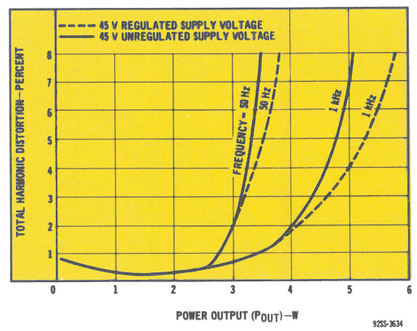
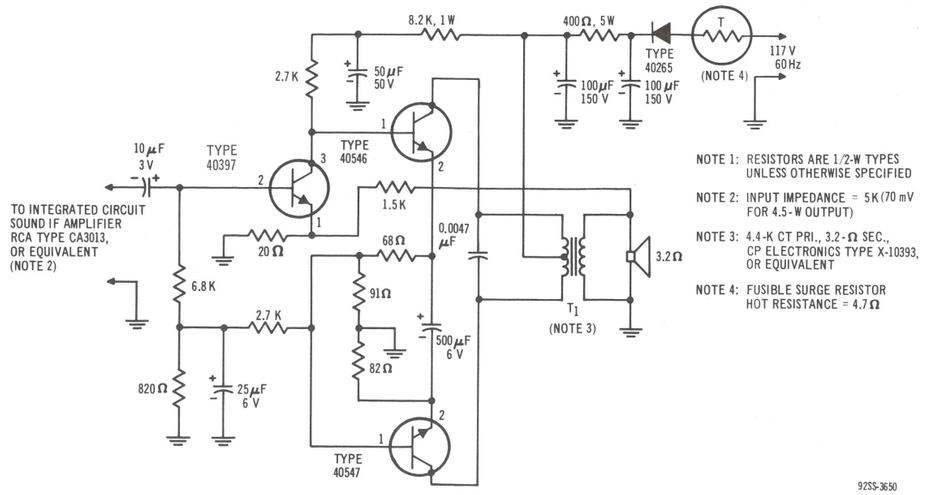


Fig. B

LINE-OPERATED, 4.5-W(RMS) AMPLIFIER FOR TV SETS

Push-Pull, Class-A Output for Extra Power at Low Cost



NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED

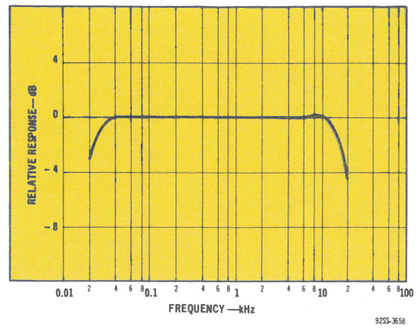
NOTE 2: INPUT IMPEDANCE = 5K (70 mV FOR 4.5-W OUTPUT)

NOTE 3: 4.4-K CT PRI., 3.2-Ω SEC., CP ELECTRONICS TYPE X-10393, OR EQUIVALENT

NOTE 4: FUSIBLE SURGE RESISTOR HOT RESISTANCE = 4.7Ω

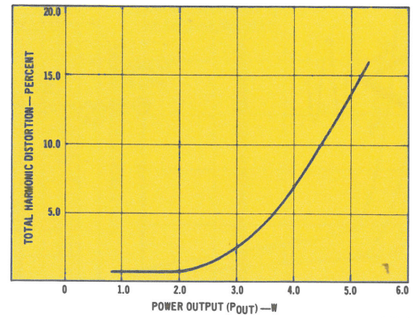
92SS-3650

- Intended for use with RCA integrated-circuit sound-IF amplifier
- Frequency response (– 3 dB): 18 Hz to 18 kHz
- Transient-protection devices not required



92SS-3658

Fig. A

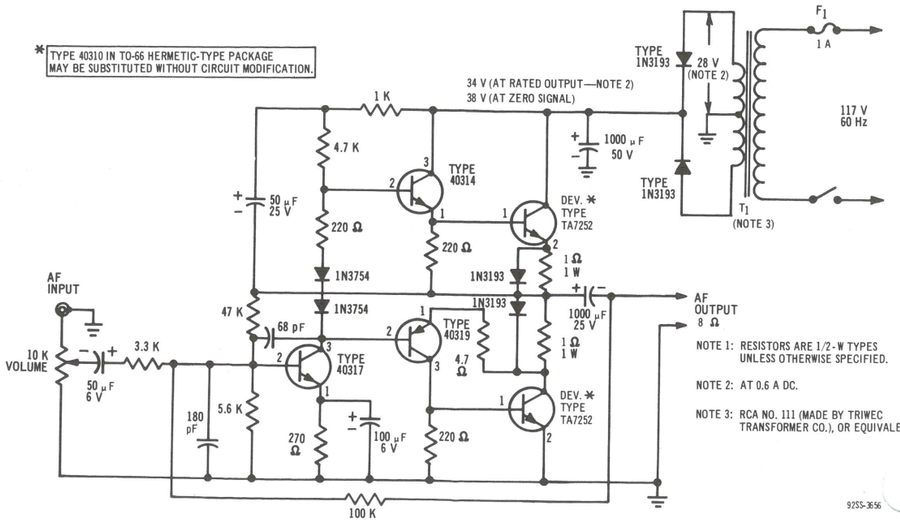


92SS-3659

Fig. B

12-W(RMS)/17-W(MUSIC) LOW-COST AMPLIFIER

Quasi-Complementary-Symmetry Circuit
Employs New "Plastic TO-66" Silicon N-P-N Transistors



NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED.

NOTE 2: AT 0.6 A DC.

NOTE 3: RCA NO. 111 (MADE BY TRIWEC TRANSFORMER CO.), OR EQUIVALENT.

92SS-3656

- 12-W (RMS) at 1.0% total harmonic distortion
- Frequency response flat within 1 dB from 30 Hz to 20 kHz
- Molded silicone-plastic hometaxial-base output transistors
- Direct coupling to load--saves the cost of an output transformer
- Greater than 48-dB power gain
- Less than 1-W quiescent dissipation

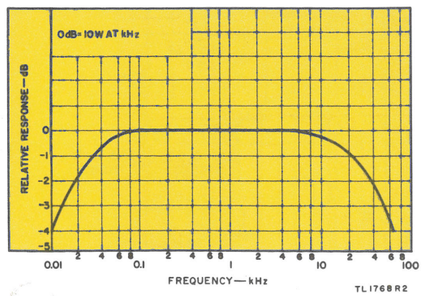


Fig. A

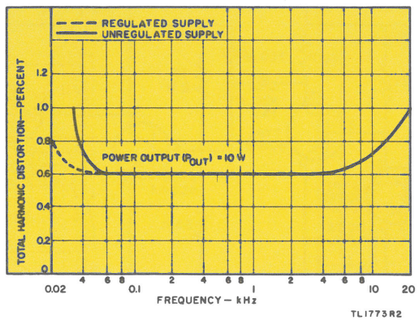


Fig. B

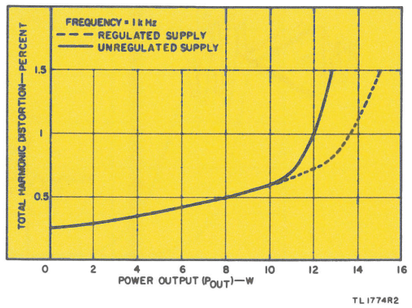
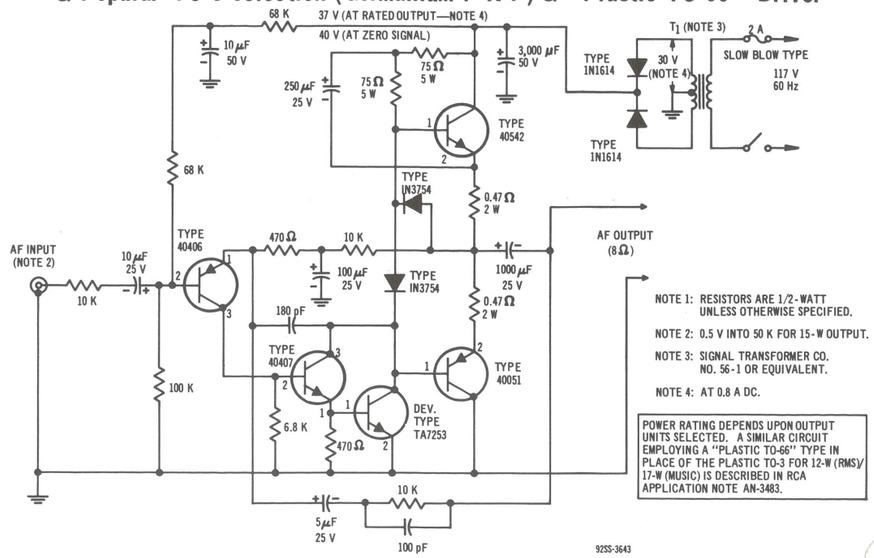


Fig. C

17-W(RMS)/24-W(MUSIC) LOW-DISTORTION AMPLIFIER

Complementary-Symmetry Circuit Employs New "Plastic TO-3" (Silicon N-P-N) & Popular TO-3 Selection (Germanium P-N-P) & "Plastic TO-66" Driver


68 K
37 V (AT RATED OUTPUT—NOTE 4)
40 V (AT ZERO SIGNAL)
10 μF 50 V
3,000 μF 50 V
250 μF 25 V
75 Ω 5 W
75 Ω 5 W
TYPE 40542
T1 (NOTE 3)
2 A
SLOW BLOW TYPE
117 V 60 Hz
30 V (NOTE 4)
TYPE 1N1614
TYPE 1N1614
68 K
TYPE 1N3754
0.47 Ω 2 W
AF INPUT (NOTE 2)
10 μF 25 V
10 K
TYPE 40406
470 Ω
10 K
100 μF 25 V
TYPE 1N3754
1000 μF 25 V
0.47 Ω 2 W
AF OUTPUT (8 Ω)
180 pF
TYPE 40407
TYPE 40051
100 K
6.8 K
DEV. TYPE TA7253
470 Ω
10 K
5 μF 25 V
100 pF
92SS-3643
NOTE 1: RESISTORS ARE 1/2-WATT UNLESS OTHERWISE SPECIFIED.
NOTE 2: 0.5 V INTO 50 K FOR 15-W OUTPUT.
NOTE 3: SIGNAL TRANSFORMER CO. NO. 56-1 OR EQUIVALENT.
NOTE 4: AT 0.8 A DC.
POWER RATING DEPENDS UPON OUTPUT UNITS SELECTED. A SIMILAR CIRCUIT EMPLOYING A "PLASTIC TO-66" TYPE IN PLACE OF THE PLASTIC TO-3 FOR 12-W (RMS)/17-W (MUSIC) IS DESCRIBED IN RCA APPLICATION NOTE AN-3483.

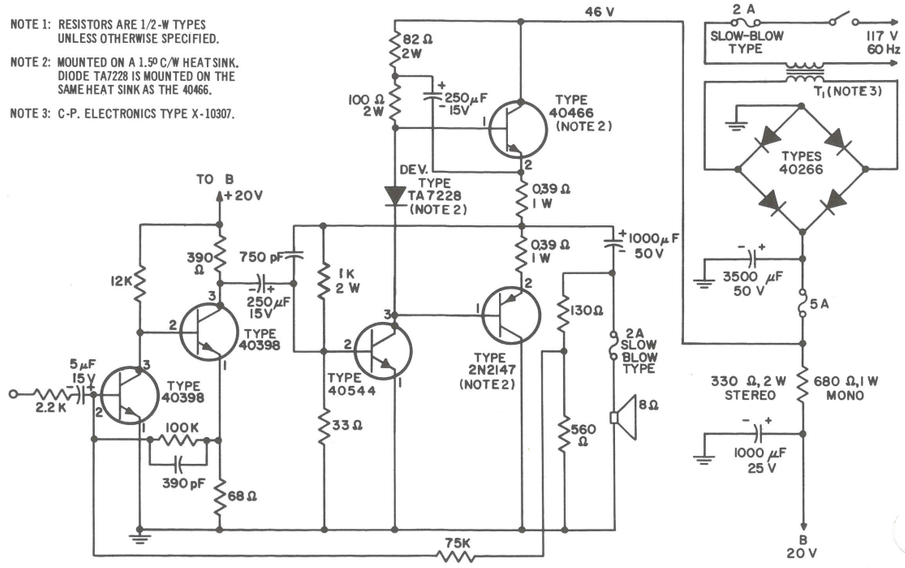
25-W(RMS)/34-W(MUSIC) PER CHANNEL AMPLIFIER FOR STEREO COMPONENTS

Complementary-Symmetry Circuit Unconditionally Stable as Defined in IHF-A-201

NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED.

NOTE 2: MOUNTED ON A 1.5° C/W HEAT SINK. DIODE TA7228 IS MOUNTED ON THE SAME HEAT SINK AS THE 40466.

NOTE 3: C-P. ELECTRONICS TYPE X-10307.



- 17-W (RMS) at 1.0% total harmonic distortion
- Low distortion——less than 0.5% at 15 W (RMS)
- Germanium p-n-p output type employs TO-3 package
- Molded silicone-plastic hometaxial-base silicon n-p-n output & driver transistors fit into TO-3 sockets

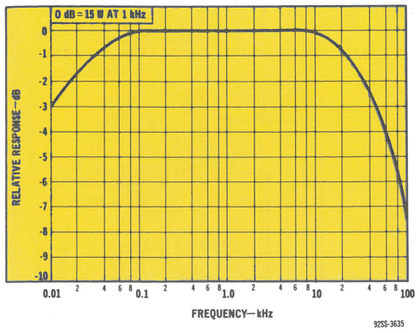


Fig. A

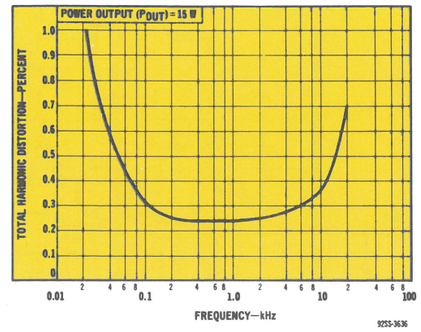


Fig. B

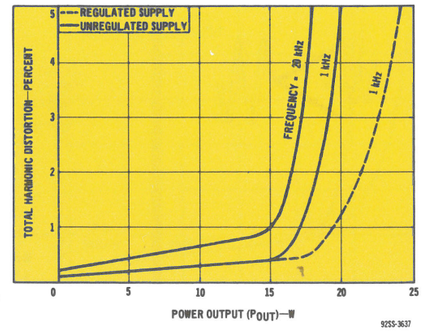


Fig. C

- 25-W (RMS) at 1.0% total harmonic distortion
- Frequency response: 10 Hz to 80 kHz

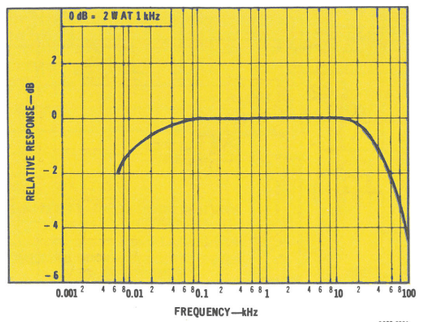


Fig. A

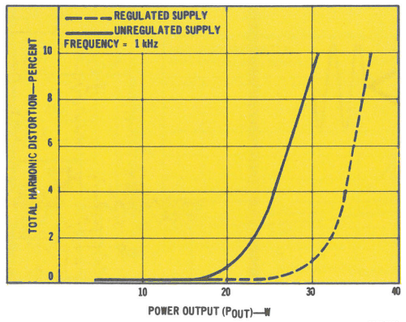
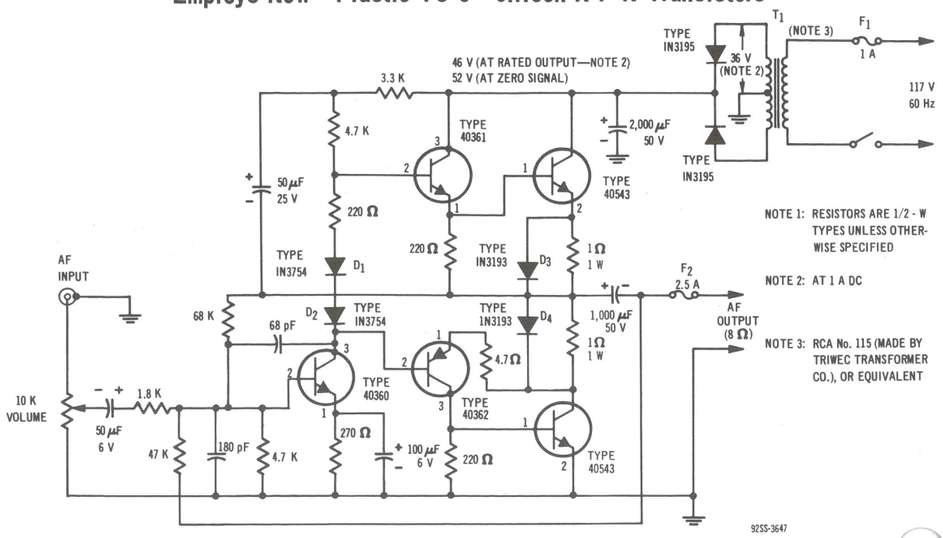


Fig. B

25-W(RMS)/34-W(MUSIC) LOW-COST, HIGH-POWER AMPLIFIER

Quasi-Complementary-Symmetry Circuit Employs New "Plastic TO-3" Silicon N-P-N Transistors



NOTE 1: RESISTORS ARE 1/2 - W TYPES UNLESS OTHERWISE SPECIFIED

NOTE 2: AT 1 A DC

NOTE 3: RCA No. 115 (MADE BY TRIWEC TRANSFORMER CO.), OR EQUIVALENT

- 25-W (RMS) at 1.0% total harmonic distortion
- Frequency response flat within 1 dB from 25 Hz to 25 kHz
- Low distortion——less than 0.3% at 20 W (RMS)
- Molded silicone-plastic hometaxial-base silicon n-p-n output transistors fit into TO-3 sockets

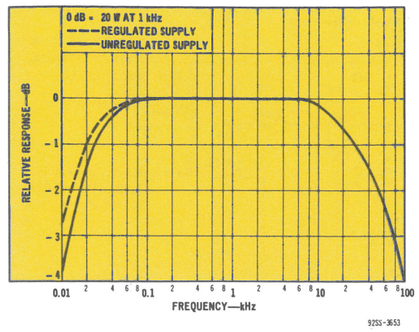


Fig. A

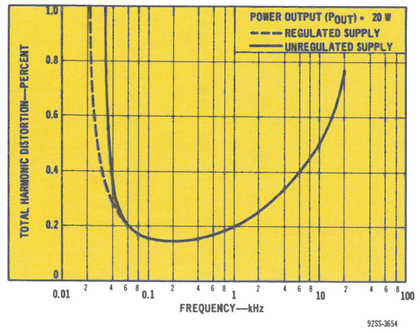


Fig. B

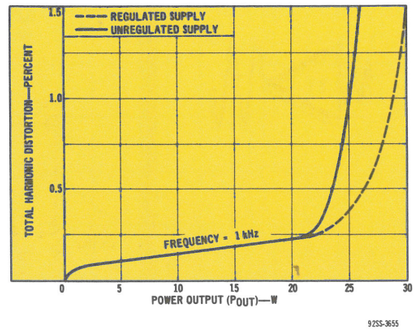
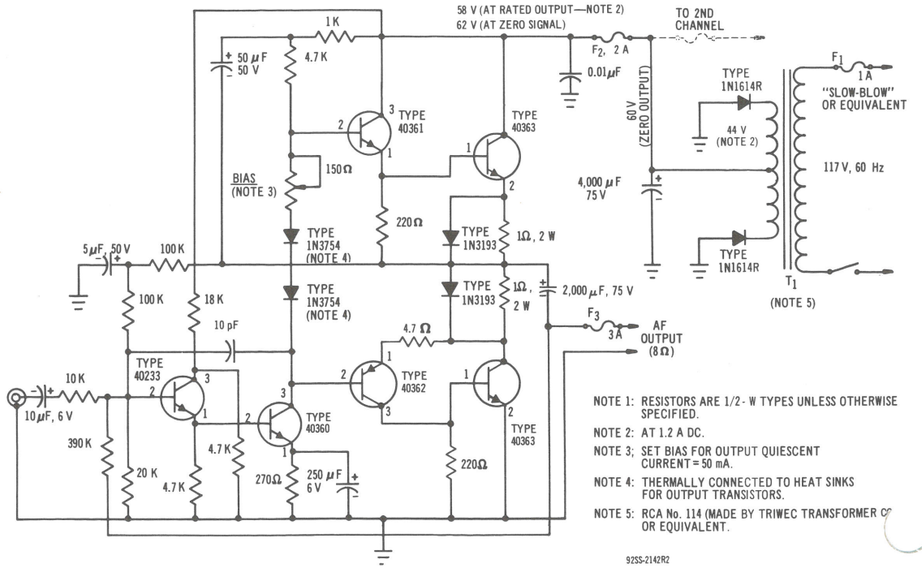


Fig. C

40-W(RMS)/50-W(MUSIC) CLASS-AB AMPLIFIER

Quasi-Complementary-Symmetry Output Circuit Employs Silicon N-P-N TO-3 Transistors



NOTE 1: RESISTORS ARE 1/2 - W TYPES UNLESS OTHERWISE SPECIFIED.

NOTE 2: AT 1.2 A DC.

NOTE 3: SET BIAS FOR OUTPUT QUIESCENT CURRENT = 50 mA.

NOTE 4: THERMALLY CONNECTED TO HEAT SINKS FOR OUTPUT TRANSISTORS.

NOTE 5: RCA No. 114 (MADE BY TRIWEC TRANSFORMER CO OR EQUIVALENT.

- 40-W (RMS) at 1.0% total harmonic distortion
- Frequency response: flat within 1 dB from 20 Hz to 20 kHz
- Low distortion——less than 0.4% at 35 W (RMS)
- Output stage short- & open-circuit proof
- 62-dB power gain
- 10-K input impedance
- Hum & noise down more than 80 dB at 35-W output

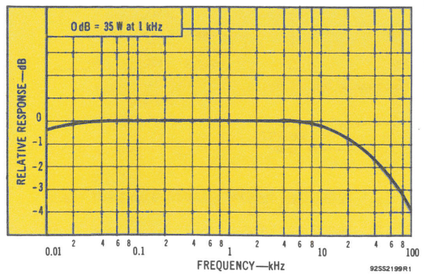


Fig. A

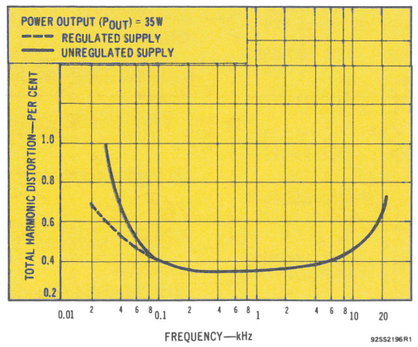


Fig. B

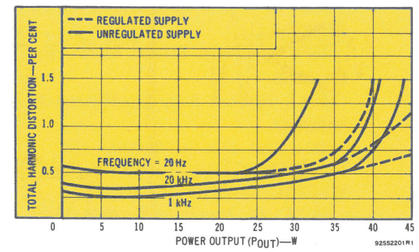
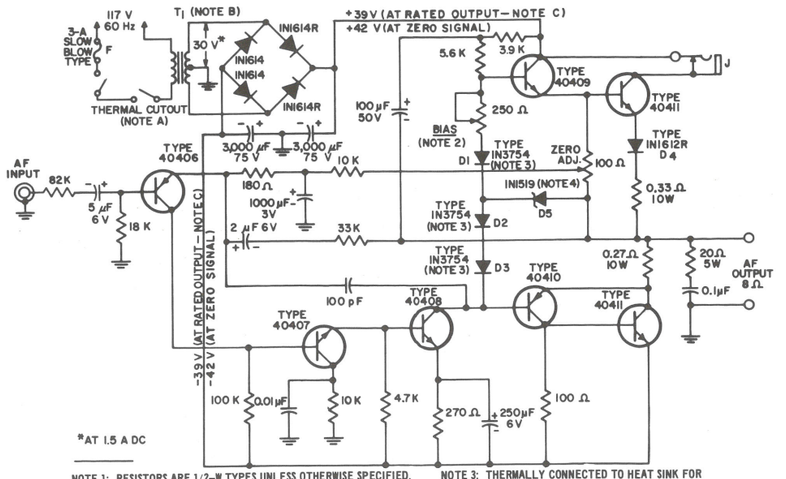


Fig. C

70-W(RMS) CLASS-AB AMPLIFIER

Series-Connected, Silicon N-P-N TO-3 Output Transistors

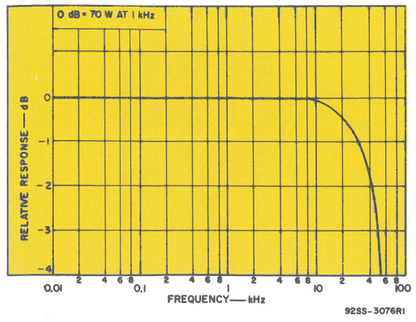


*AT 1.5 A DC

NOTE 1: RESISTORS ARE 1/2-W TYPES UNLESS OTHERWISE SPECIFIED.
NOTE 2: SET BIAS FOR 20 mA QUIESCENT CURRENT. (MEASURED AT J WITHOUT LOAD)
NOTE A: 100°C THERMAL CUTOUT ATTACHED TO HEAT SINK FOR OUTPUT TRANSISTORS (ELMWOOD SENSOR, PART NO. 2455-88-4, OR EQUIVALENT).
NOTE 3: THERMALLY CONNECTED TO HEAT SINK FOR OUTPUT TRANSISTORS.
NOTE 4: ZENER DIODE.
NOTE B: RCA NO. 113 (MADE BY TRIWEC TRANSFORMER CO.), OR EQUIVALENT
NOTE C: AT 1.5 A DC

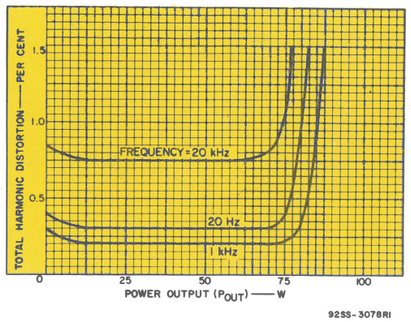
92SS-3083R2

- Low distortion—less than 0.3% at 70 W (RMS)
- Frequency response flat within 1 dB from 5 Hz to 25 kHz
- Capable of sustaining continuous short- or open-circuited output terminals under full-drive conditions
- 68-dB power gain
- 100-K input impedance
- 0.8 V input for 70-W output
- Hum & noise down more than 60 dB from 1 W



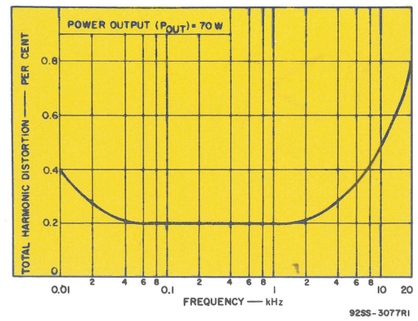
92SS-3076RI

Fig. A



92SS-3078RI

Fig. B



92SS-3077RI

Fig. C

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